



MatPlanWDM: An Educational Open-source Tool for Communication Networks Planning Courses

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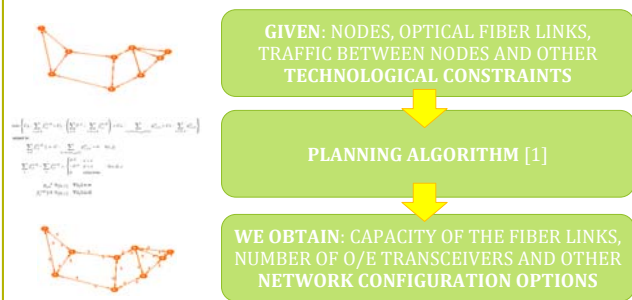
Abstract

This poster presents MatPlanWDM tool and its application as an educational resource in *Communication Networks Planning* courses in the Technical University of Cartagena (Spain). MatPlanWDM is implemented as a MATLAB toolbox, together with a Graphical User Interface. It is devoted to the network planning of Wavelength-Routed (WR) optical Wavelength Division Multiplexing (WDM) networks. The tool includes a built-in heuristic algorithm and two solvers to obtain the optimum planning solution in small topologies. MatPlanWDM is designed to assist the student in the definition and comparative evaluation of its original network planning algorithms. The software can be publicly downloaded at the MatPlanWDM site.

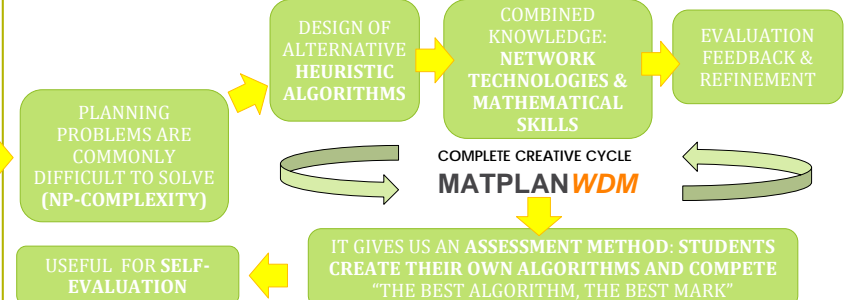
Resumen

Este póster presenta la herramienta MatPlanWDM y su aplicación como recurso docente en asignaturas de *Planificación de Redes de Comunicaciones* en la Universidad Politécnica de Cartagena (España). MatPlanWDM está implementada como una toolbox de MATLAB junto con una interfaz gráfica. Se utiliza para la planificación de redes ópticas *Wavelength-Routed (WR) Wavelength Division Multiplexing (WDM)*. La herramienta incluye un algoritmo heurístico y dos *solvers* para obtener la planificación óptima en topologías pequeñas. MatPlanWDM está diseñada para ayudar al estudiante en la definición y evaluación comparativa de sus propios algoritmos de planificación. El software puede ser descargado gratuitamente desde la página Web de MatPlanWDM.

Background: Optical Network Optimization



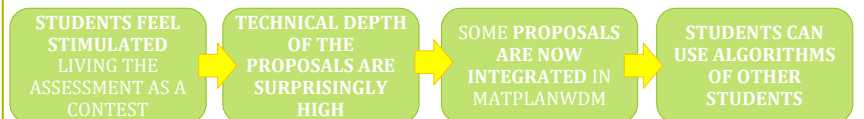
Motivation



Learning Experience

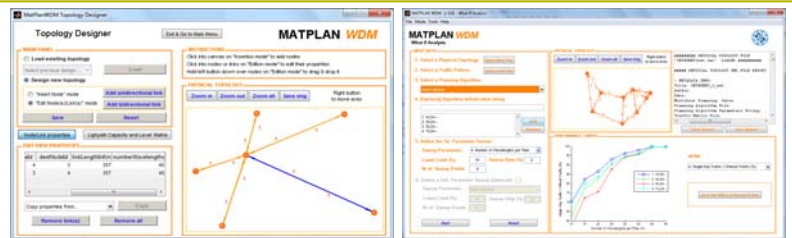
- "Planificación Avanzada de Redes de Comunicaciones" (5th year, "Ingeniero de Telecomunicación", Technical University of Cartagena, UPCT, Spain)
- "Photonic telecommunication networks" (1st semester, Master of Science in Information and communication technology", FER, University of Zagreb, Croatia)
- "Optimization and planning in optical networks" (BONE Master School, BONE Network of Excellence of the 7th Framework Program of the EU [4])
- And in 2 years: "Planificación y Gestión de Redes" (3rd year, "Grado en Ingeniería Telemática", Technical University of Cartagena, UPCT, Spain)

Students' Feedback



A quick tour into MatPlanWDM

The tool MatPlanWDM developed by the authors [2] has been specifically designed to assist in the student learning process in the planning of optical WDM networks [3]. This process is facilitated by the included libraries of algorithms for classical network optimization problems.



References

- [1] R. K. Ahuja, T. L. Magnanti and J. B. Orlin, Network flows. Theory, algorithms and applications, Prentice-Hall, 1993.
- [2] MatPlanWDM Website, <http://ait.upct.es/~ppavon/matplanwdm>.
- [3] C.S.R. Murthy and M. Gurusamy, WDM Optical Networks (Concepts, Design and Algorithms), Prentice Hall PTR, Upper Saddle River, 2002.
- [4] FP7 BONE Network of Excellence, http://www.ict-bone.eu/portal/landing_pages/index.html (last access: 1st May, 2011).

Conclusions

This poster presents MatPlanWDM network planning tool, focusing on its utilization in *Communication Networks Planning* courses in the Technical University of Cartagena (Spain). The tool is a valuable resource to support the teaching of the planning methodology. Students are provided with example heuristics, which serve as starting points to devise their own ones. Moreover, example algorithms and a built-in optimum solver become a good reference for performance comparison. MatPlanWDM also contributes to the assessment of the learning outcomes. A part of the student evaluation mark is based on the observable merits of a student-proposed optimization algorithm. This type of assessment method promotes student motivation, benefiting the achievement of the instructional objectives of the course.